REMARKS

Claims 1, 2, 6, 8, 9, 17-26 are rejected under 35 USC §102 as being anticipated by McLafferty, U.S. 4,135,787.

Independent claim 1 recites a method of making a low-loss electromagnetic wave resonator structure. The method includes providing a resonator structure. The resonator structure includes a confining device and a surrounding medium, and supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supports at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to reduce or eliminate radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

Independent claim 19 recites a method of making a low-loss electromagnetic wave resonator structure. The method includes providing a resonator structure. The resonator structure includes a confining device and a surrounding medium, and supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supports at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to increase

radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

Independent claim 21 recites a method of making a low-loss acoustic wave resonator structure. The method includes providing a resonator structure. The resonator structure includes a confining device and a surrounding medium, and supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supports at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to reduce or eliminate radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

Independent claim 22 recites method of designing a low-loss electronic wave resonator structure. The method includes providing a resonator structure. The resonator structure includes a confining device and a surrounding medium, and supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supports at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to reduce or eliminate radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

Independent claim 23 recites a method of making a low-loss acoustic wave resonator structure. The method includes providing a resonator structure. The resonator structure includes a confining device and a surrounding medium, and supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supports at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to increase radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

Independent claim 25 recites method of making a low-loss electronic wave resonator structure. The method includes a confining device and a surrounding medium. The resonator structure supports at least one resonant mode. The resonant mode displays a near-field pattern in the vicinity of the confining device and a far-field radiation pattern away from the confining device. The surrounding medium supporting at least one radiation channel into which the resonant mode can couple. Moreover, the method includes specifically configuring the resonator structure to increase radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristics of the near-field pattern substantially unchanged.

McLafferty '787 describes a resonator structure containing spatial filters to eliminate unwanted high-order transverse modes. Without these spatial filters, the resonator structure supports both the fundamental mode and other high-order transverse modes. The high-order

modes will be excited by fluctuations of the surrounding media or external excitations. In laser action, the presence of these modes will compete with the fundamental mode and limit the quality of the output beam. This problem is addressed by putting in spatial filters to absorb or deflect these high-order modes after they are excited.

The Examiner states that McLafferty '787 discloses a resonator structure where "... the surrounding medium supporting at least one radiation channel into which the resonant mode can couple; and specifically configuring the resonator structure to reduce or increase radiation loss from the resonant mode into at least one of the radiation channels, while keeping the characteristic of the near-field pattern substantially unchanged." Applicants respectfully disagree with the Examiner's reading of the reference.

McLafferty '787 teaches how to eliminate energy in the unwanted modes so that they do not interfere with proper lasing action of the wanted modes. It does not address the question of how not to excite these unwanted modes. The present invention describes how to control the excitation of unwanted modes to preserve or dispense energy in the modes of interest. It does not care about the energy that ends up in the radiation modes.

In particular, McLafferty '787 does not disclose a method to prohibit these high-order modes from being excited in the first place, nor is the question of energy leaking out to radiation modes (which carries energy away from the resonator structure in a uncontrolled fashion) ever raised or addressed. Only the method to eliminate high-order modes after they are excited is disclosed. This is sufficient for laser actions, but can not be used to control the energy leak of the fundamental mode into these high-order modes. Since the gain media is not

an inherent component of the resonator, let us consider the action in the resonator without the gain media. If the fundamental mode is set up in the resonator with some energy, and the output coupling structure and the gain media are absent, then the electromagnetic wave will circulate in the resonator. Through disturbance in the surrounding media or imperfections in the mirrors, some energy will be transferred to the high-order transverse modes or radiation modes. The high-order transverse modes will be absorbed or deflected by the spatial filter. The energy in the fundamental mode will decrease with time.

In contrast, the present invention describes how to control the excitation of any radiation modes which could leak energy from the resonator. The goal is never to eliminate the radiation modes once they are excited. Even if it is possible to absorb the energy in the radiation modes, it serves no purpose, for the energy has already been lost to the resonator. Therefore, McLafferty '787 does not anticipate claims 1, 19, 21, 22, 23, and 25.

As to claims 2, 6, 8, 9, 17-18, 24, and 26, they are dependent on claims 1, 23, and 25, respectively. Therefore, claims 2, 6, 8, 9, 17-18, 24, and 26 are also allowable for the same reasons argued with respect to claims 1, 23, and 25.

Claims 10 and 11 are rejected under 35 USC §103 as being unpatenable over McLafferty '787.

Given that claims 10 and 11, are dependent on claim 1, the reasons argued for claim 1 are also applicable here. Moreover, the Examiner's obvious does not remedy the deficiencies of McLafferty '787. Therefore, McLafferty '787 does not render obvious claims 10 and 11.

Claims 12, 14, and 15 are rejected under 35 USC §103 as being unpatentable over McLafferty '787 in view of Stewart, U.S. 5,311,605.

Stewart '605 describes an optical device comprising a length of optical waveguide (1) having incorporated therein an extended sequence of coupled single resonator structures (9) so as to form an optical slow wave structure. The sequence of resonator structures is suitably formed by a Bragg diffraction grating pattern (7) extending along the waveguide.

Given that claims 12, 14, and 15 are dependent on claim 1, the reasons argued for claim 1 are also applicable here. Also, Stewart '605 does not address the deficiencies of McLafferty '787. Therefore, the proposed combination of McLafferty '787 and Stewart '605 does not render obvious claims 12, 14, and 15.

Claims 3-5, 7, and 16 are rejected under 35 USC §103 as being unpatentable over McLafferty '787 in view of Villeneuve et al., U.S. 6,130,969.

Villeneuve et al. '969 describes a channel drop filter that employs a coupling element including a resonator-system between two waveguides, which contains at least two resonant modes. The resonator-system includes one or more interacting resonant cavities which in addition to being coupled to the waveguides, can also be coupled directly among themselves and indirectly among themselves via the waveguides. Each component of the coupling element can be configured or adjusted individually. The geometry and/or dielectric constant/refractive index of the resonator-system are configured so that the frequencies and decay rates of the resonant modes are made to be substantially the same.

Given that claims 3-5, 7, and 16 are dependent on claim 1, the reasons argued for claim 1 are also applicable here. Also, Villeneuve et al. '969 does not address the deficiencies of McLafferty '787. Therefore, the proposed combination of McLafferty '787 and Villeneuve et al. '969 does not render obvious claims 3-5, 7, and 16.

Claim 13 is rejected under 35 USC §103 as being unpatentable over McLafferty '787 in view of Stewart '605, further in view of Villeneuve et al '969.

Given that claim 13 is dependent on claim 1, the reasons argued for claim 1 are also applicable here. Also, Stewart '605 and Villeneuve et al. '969 do not address the deficiencies of McLafferty '787, as described herein. Therefore, the proposed combination of McLafferty '787, Stewart '605, and Villeneuve et al. '969 does not render obvious claim 13.

In view of the above amendments and for all the reasons set forth above, the Examiner is respectfully requested to reconsider and withdraw the rejections made under 35 U.S.C. §§ 102 and 103. Accordingly, an early indication of allowability is earnestly solicited.

If the Examiner has any questions regarding matters pending in this application, please feel free to contact the undersigned below.

Respectfully submitted,

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